



# Mission Concept: Mars 2020

Over the past two decades, missions flown by NASA's Mars Exploration Program have shown us that Mars is a rocky, cold, and dry planet underneath a dusty, sometimes volatile pink sky. Using a mix of detailed measurements from orbital and landed missions, scientists have discovered hints in today's Martian wasteland that the Red Planet was once an active place where volcanoes raged, meteors plowed deep craters, and flash floods rushed over the land. Together, these processes and others point to past wet conditions of sufficient longevity to support the development of microbial life.

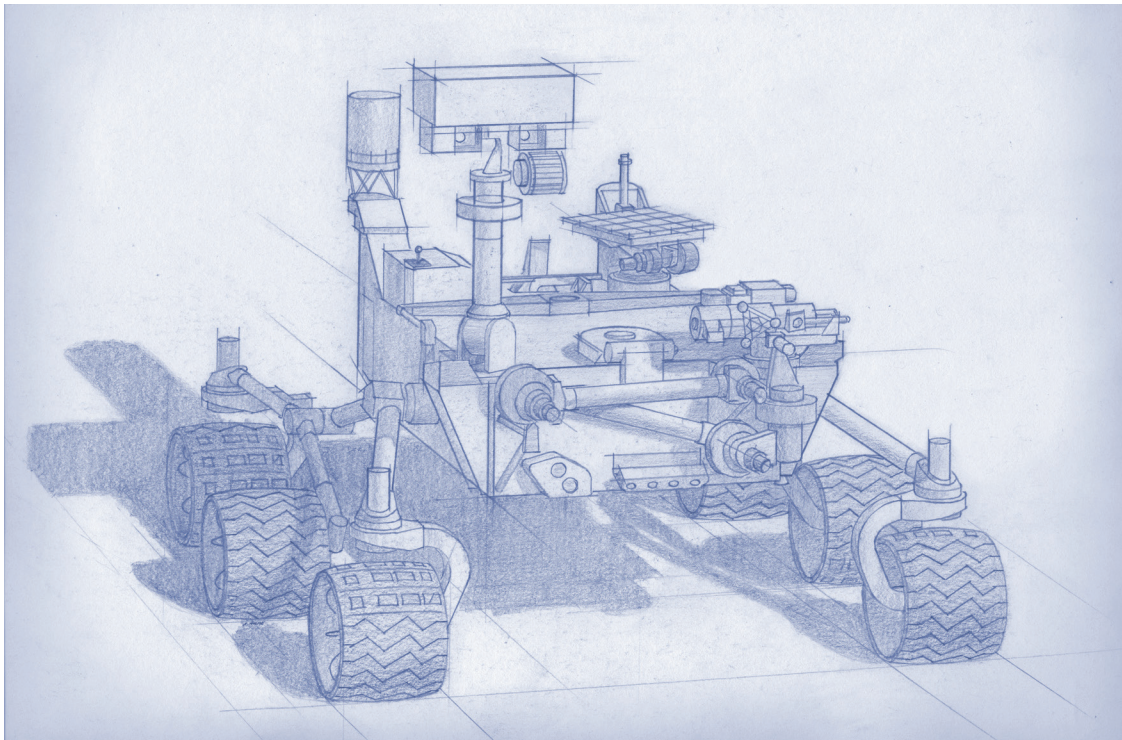
NASA's proposed Mars 2020 mission would build upon many discoveries from the Curiosity Mars rover and the

two Mars Exploration Rovers, Spirit and Opportunity by taking the next key steps in our understanding of Mars' potential as a habitat for past or present life.

Searching for scientific clues to answer this question means delving into the planet's geologic and climate history to find out how, when, and why Mars underwent dramatic changes to become the harsh planet we observe today.

The Mars 2020 rover would be designed to seek signs of past life on Mars, collect and store a set soil and rock samples that could be returned to Earth in the future, and test new technology to benefit future robotic and human exploration of Mars.

## Proposed Mars 2020 Mission: Key Features



- Seek signs of past life
- Collect a returnable cache of samples using a coring system
- Use efficient surface operations, one Mars-year lifetime
- Prepare for human exploration
- Benefit from design heritage of Curiosity rover
- Explore a geologically diverse landing site
- Confirm ancient habitability of site
- Make coordinated scientific measurements, down to microscopic level
- Improve entry descent, landing technology for precise landing

## Proposed Mars 2020 Mission: Main Objectives

Explore an ancient environment that, from both orbital measurements and surface data about Mars, has the potential to have supported life in the past.

Assess the ability of this Martian environment to have preserved any signs of past life (biosignatures) and search out potential evidence of these signs.

Gather a scientifically compelling and well-documented set of rock and soil samples, and assemble them into a sealed container that could be returned to Earth by a future NASA mission.

Demonstrate key technologies beneficial for future robotic and human exploration of Mars, such as improved navigation techniques for precision landings and possibly some steps of the process to capture oxygen from the atmosphere of Mars.

## Proposed Mars 2020 Mission: Key Hardware

- Rover body and other major hardware (such as the cruise stage, aeroshell, and heat shield) would be near-duplicates of Curiosity's systems to take maximum advantage of engineering heritage.
- Rover would be outfitted with new competitively selected science instruments and technology experiments.

- The rover's baseline power source would be a Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) provided by the U.S. Department of Energy, which uses the heat from the natural decay of plutonium-238 to generate electricity. Solar power options are also being considered.

## Proposed Mars 2020 Mission: Timeline

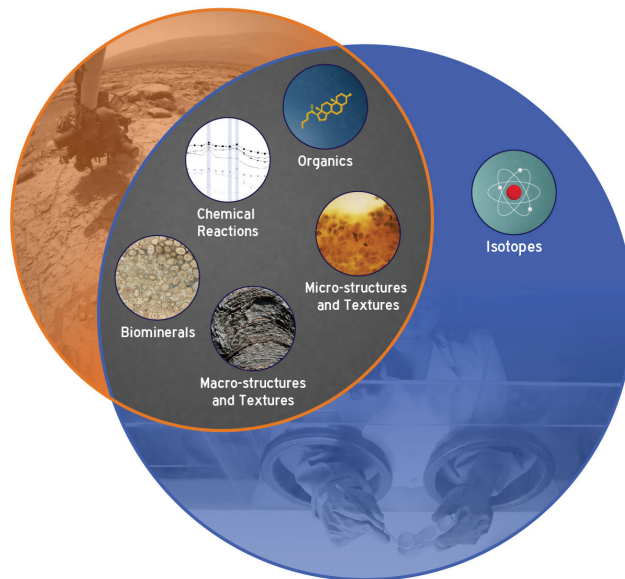
- Launch in July-August 2020 from Cape Canaveral Air Force Station, Fla., on an intermediate launch vehicle.
- Land on Mars in February 2021 at a site to be determined.
- Spend at least one Mars year (two Earth years) exploring the landing site region.

## Program Management

The Mars 2020 Project is managed for NASA's Science Mission Directorate, Washington, D.C., by the Jet Propulsion Laboratory (JPL), a division of the California Institute of Technology in Pasadena, Calif.

At NASA Headquarters, George Tahu is the Mars 2020 program executive and Mitchell Schulte is program scientist. At JPL, John McNamee is the Mars 2020 project manager and Ken Farley of Caltech is project scientist.

## Types of Biosignatures for Study on Mars and Possibly on Earth in the Future



For more information about the proposed Mars 2020 mission and NASA's Mars exploration program, visit :  
**[mars.jpl.nasa.gov](https://mars.jpl.nasa.gov)**